

Glenn Research Center

Nuclear Dynamics and Control Facility (B-3)

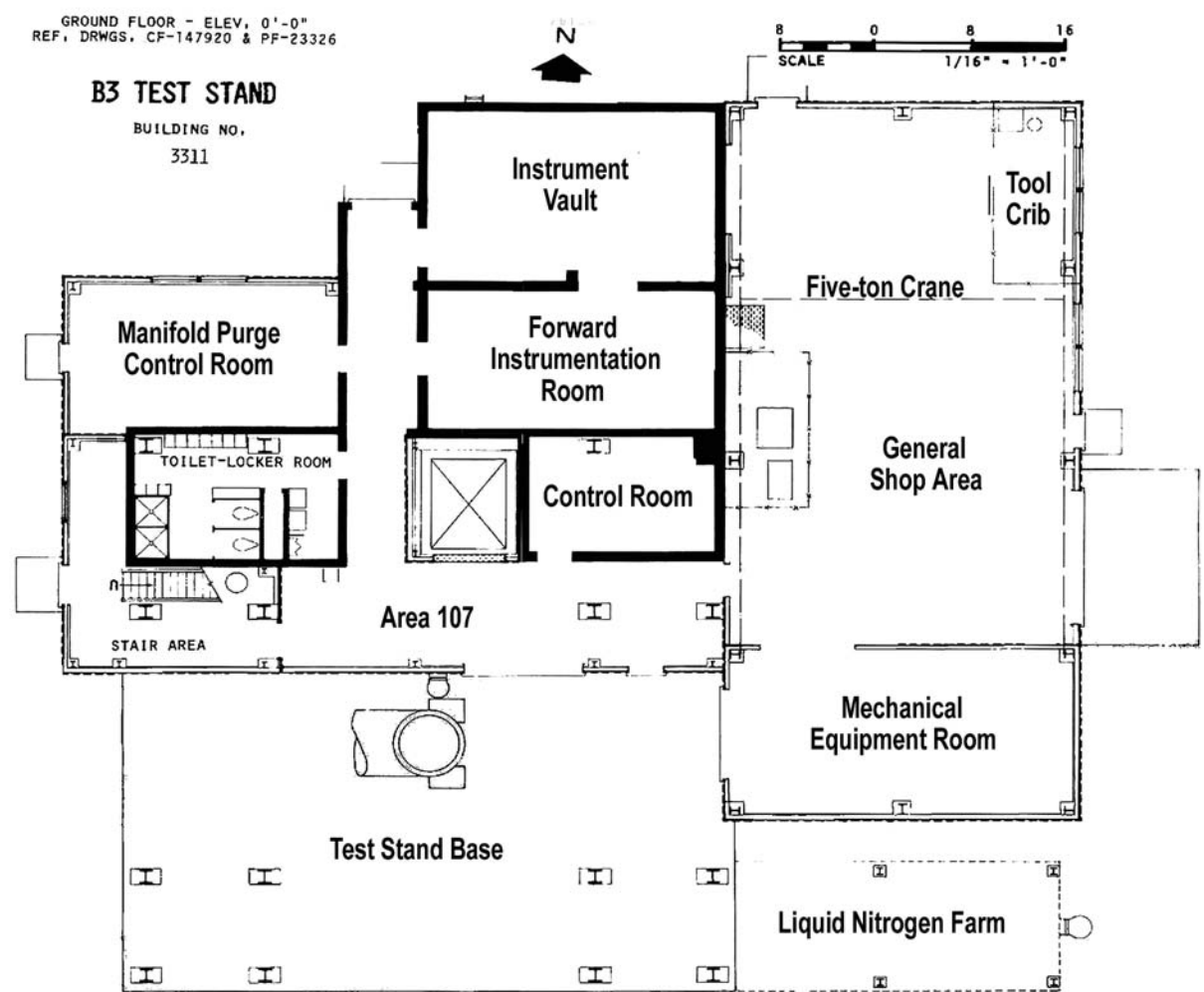
The Nuclear Dynamics and Control Facility (B-3), Building 3311, was designed to conduct altitude tests on various components of second-generation nuclear rocket engines. The focus was initially on the propellant system, the cryogenic turbopumps, and the incorporation of those turbopumps into rocket propellant systems. B-3 was modified so that Titan-Centaur shroud jettison tests could be run.

At 210 ft in height, the 50- by 50-ft square B-3 tower was the tallest structure at Plum Brook Station. The tower was enclosed above the 74-ft level, but it had large doors on three sides for ventilation. The test apparatus was mounted on the third level, 74 ft above grade. A liquid-hydrogen propellant tank was mounted inside the test stand with the bottom of the tank approximately 115 ft above grade and 42 ft above the test article. Like B-1, B-3 could operate a rocket engine in simulated space conditions to test the turbopumps, heat transfer, flow rate, and other properties without firing the engine.

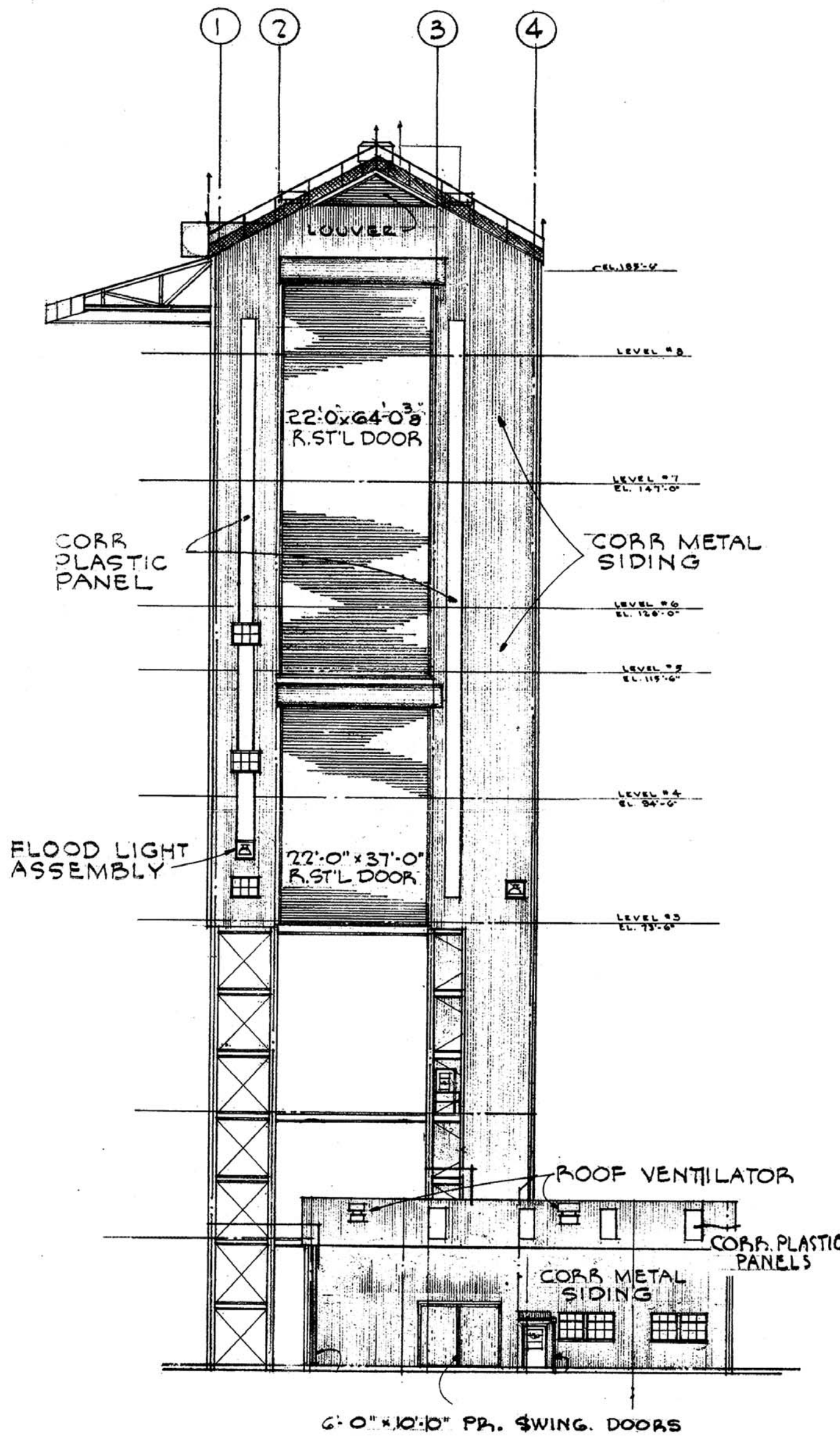
The parallel pumps could be driven at liquid-hydrogen discharge flow rates up to 200 lb/sec. The rocket exhausted its propellant downward through a 54-in.-diameter exhaust line that was tied into the B-1 exhaust system. The exhaust system performance was essentially the same for both facilities. B-3 had its own burnoff stake 351 ft southeast of the test stand to dispose of hydrogen after the test run. B-3 also had a boiler house for heating the facility.

A 200,000-gal liquid-hydrogen storage dewar was located at grade level about 400 ft from B-3. Gaseous helium and nitrogen were supplied from trailers and gaseous hydrogen from two railcars.

A concrete shelter at the base of B-3 housed the manifold and purge control room with control equipment for the purge systems, the forward instrumentation rooms with electric equipment for signal conditioning, the control room with control, relay, power, and communications equipment, the mechanical equipment room with liquid-oxygen and -nitrogen pumps and electric shop, and the general shop area with a 5-ton crane. All test operations were conducted remotely from a reinforced concrete control building 2600 ft from the test structure. The test procedures for the turbopump studies were almost identical to those for B-1.



B-3 Floor Plan



B-3 East Elevation – Scale: 16" = 1'-0"